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Algorithm

t:=0;
encode and initialize P(0)
decode and evaluate P(0)
do
    recombine P(t)
    mutate P(t)
    decode P(t)
    evaluate P(t)
    P(t+1) = select (P(t)
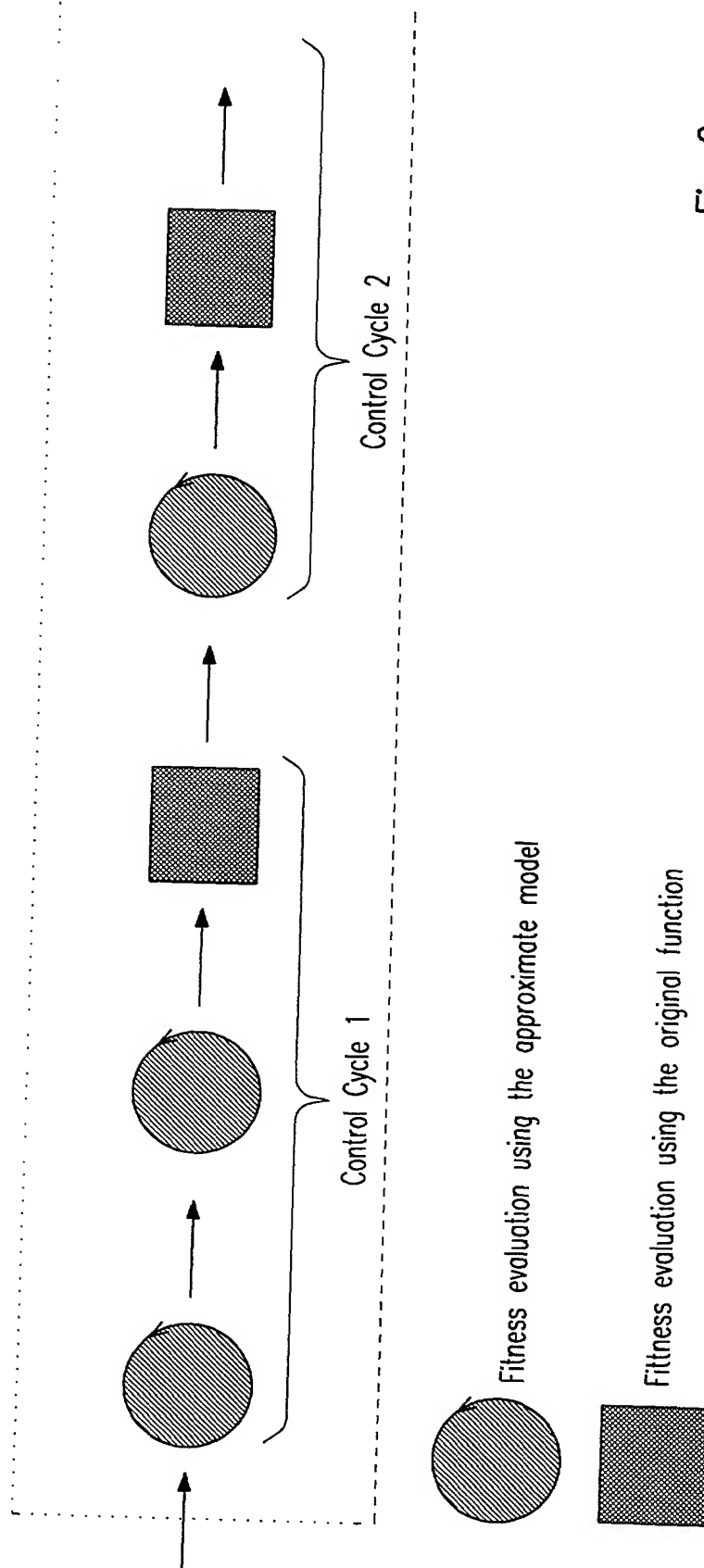   encode P(t+1)
    t:=t+1
until terminate
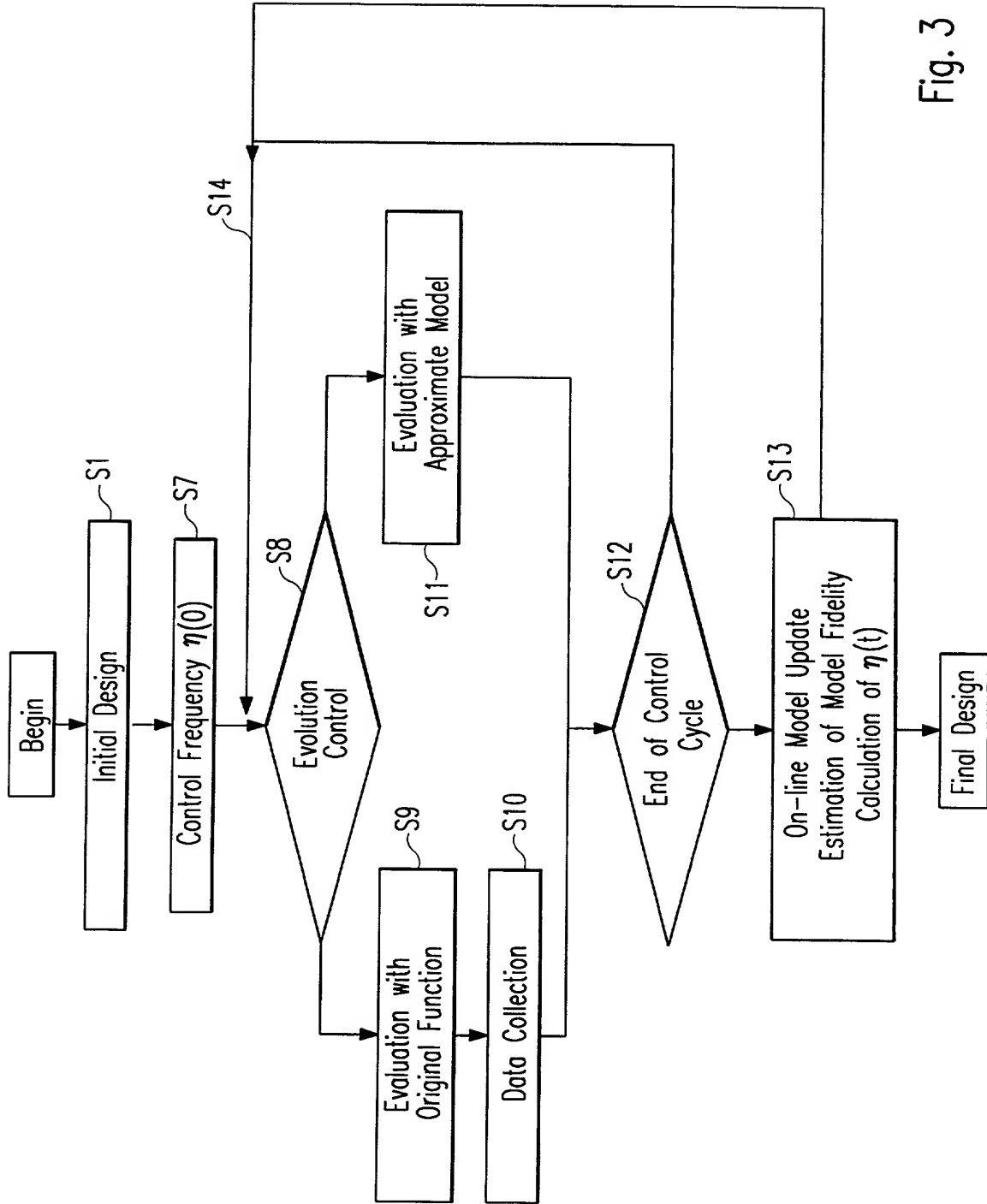
Fig. 1

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Control Cycle 1

Control Cycle 2

Fitness evaluation using the approximate model

Fitness evaluation using the original function

Fig. 2

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Begin

Initial Design ~ S1

Control Frequency $\eta(0)$ ~ S7

Evolution Control ~ S8

Evaluation with Approximate Model ~ S11

Evaluation with Original Function ~ S9

Data Collection ~ S10

End of Control Cycle ~ S12

On-line Model Update
Estimation of Model Fidelity
Calculation of $\eta(t)$ ~ S13

Final Design

S14

Fig. 3

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Fig. 4

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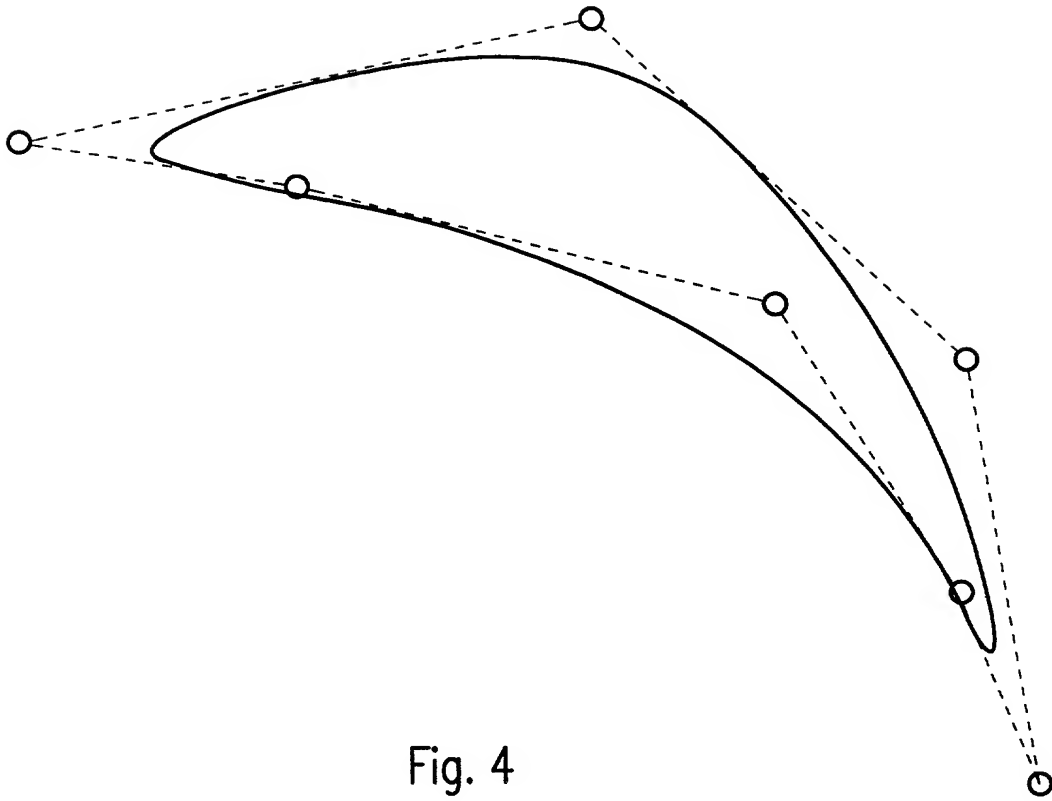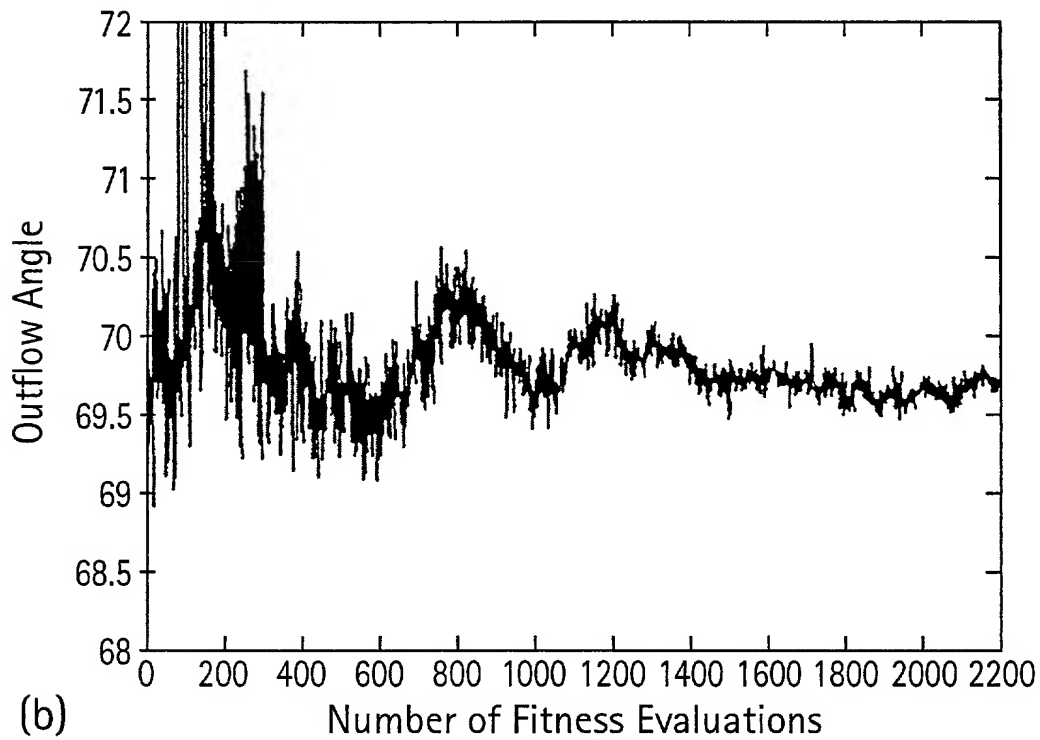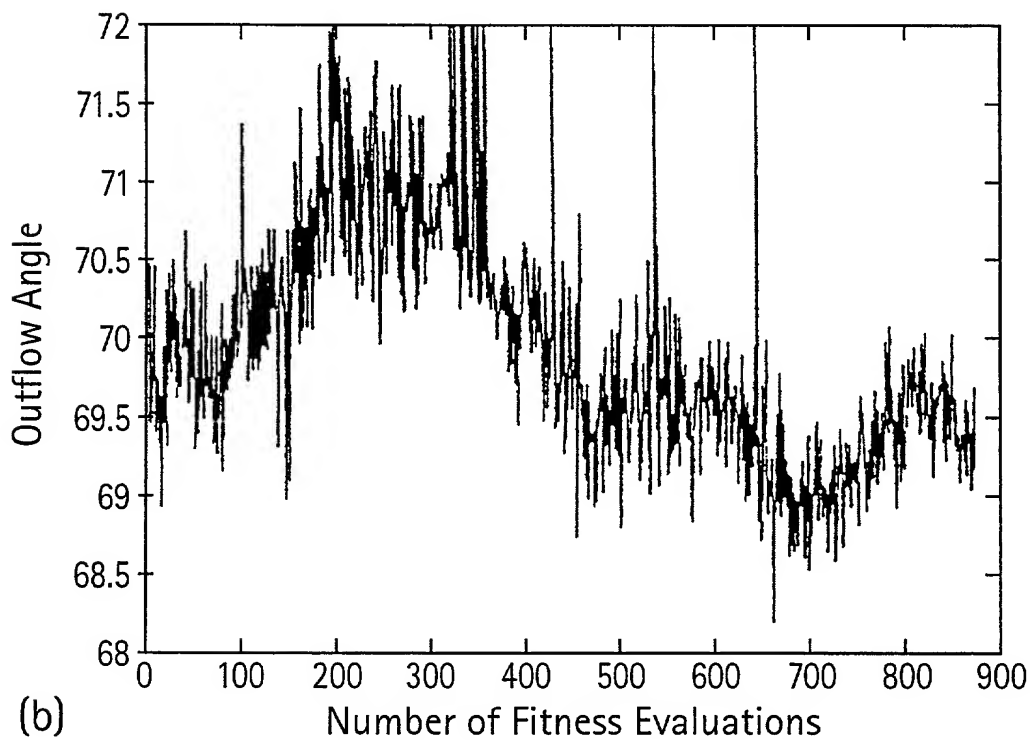Atty. Docket No.: 6445
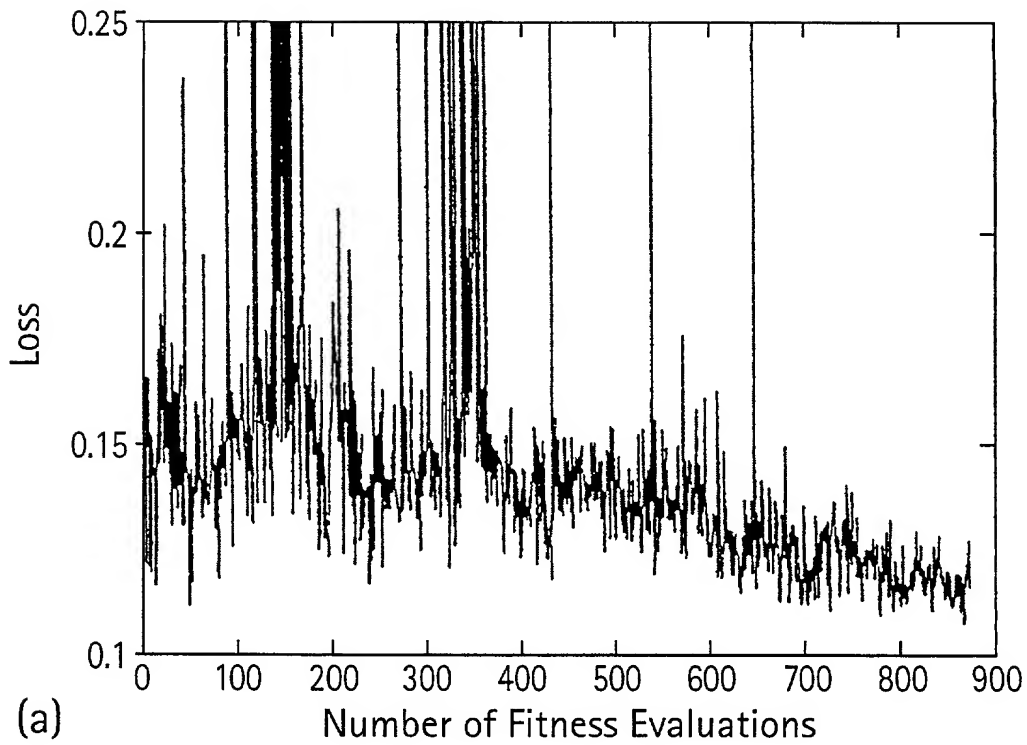Sheet 5 of 6

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(a)

(b)

Fig. 5 Blade optimization with approximate models (a) Pressure loss
(b) Outflow angle.

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(a)

Number of Fitness Evaluations

(b)

Number of Fitness Evaluations

Fig. 6   Blade optimization with approximate models (a) Pressure loss (b) Outflow angle.